NASA TECH BRIEF

Tungsten Fiber-Reinforced Copper Composites Form High Strength Electrical Conductors

Investigations to determine the tensile properties of composites utilize a model system, tungsten fibers in a copper matrix, in which both components are mutually insoluble. The results of these investigations show that the ultimate tensile strength, yield strength, and modulus of elasticity of the composites are proportional to fiber content.

While many applications exist for the use of composite materials as structural members, of particular interest is their adaptability to high strength electrical conductors. For such an application, the electrical resistivity and conductivity of the composite materials must be known. Since the tungsten fibers and copper are insoluble in each other, the electrical properties would be expected to follow the example of binary alloys such as Pb–Sn and Zn–Cd. These alloys are mixtures of two phases, and the conductivities, not the resistivities, follow a linear relation with composition expressed in volume percent. Since copper and tungsten act as a mixture in a composite, the conductivity of tungsten fiber-reinforced copper composites should also be a linear function of fiber volume percent.

This investigation determines the electrical resistivity and conductivity of tungsten fiber-reinforced copper composites over a wide range of fiber contents for composites containing both continuous and discontinuous fibers and relates the results to fiber content.

Note:

Further information concerning this invention is presented in NASA TN D-3590, "Electrical Resistivity and Conductivity of Tungsten-Fiber-Reinforced Copper Composites," by David L. McDanels, August 1966, available from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia, 22151; price $1.00. Inquiries may also be directed to:

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Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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